would lead one to expect. It is especially difficult to find suitable vessels for it. Thin glass in one piece, like test-tubes and beakers, does very well, but thick glass and all kinds of cement are mostly cracked by cooling; and massive vessels involve the waste of a large volume of the liquid in the process of cooling them down to $-180°$ C. With some trouble, however, Liveing and Dewar have succeeded in measuring the refractive index of liquid oxygen, at its boiling point, for the *D* ray of sodium. They used a hollow prism with glass faces clamped together and made tight at the joints with glycerine. The refractive index so found was 1.2236, somewhat less than that of water in the liquid state, which, near its boiling point, is about 1.32.

The density of oxygen at $-182°$ is 1.124. These figures give for the refraction constant, $\frac{\mu^2 - 1}{(\mu^2 + 2)\, d} = .1265$, and for the corresponding refraction equivalent 2.024. The mean values of the constant and equivalent as found by Mascart and Lorenz for gaseous oxygen are the same as those here given for the liquid.

Ozone is more easily liquefied than ordinary oxygen, but is formed with a storage of energy, and in a concentrated state is very explosive. When oxygen, ozonized in a Siemens' tube cooled with solid carbonic acid and ether, is passed into liquid oxygen, the ozone is dissolved and imparts a deep-blue color to the liquid. The boiling point of oxygen is lower than that of ozone, so that, as the oxygen evaporates, the strength of the solution and the depth of its color increase. The last drop has a steel-blue color, and explodes spontaneously with violence. If a glass tube conveying ozonized oxygen be cooled down to $-180°$ C, or nearly so, the liquid ozone may be seen condensing on the sides and running down. It has been found impossible to collect the liquid, however, for no sooner have two or three small drops run together than they explode, shattering the vessel.

It is certainly remarkable that a substance which, unlike many substances which are formed with a storage of energy, is so unstable at high temperatures, should also be very unstable at low temperatures. Perhaps its instability may be connected with its powerful absorption of light, which is put in evidence by its deep color. What the form may be in which its excessive energy is stored, we can at present only guess at. Can it be that the three atoms, of which its molecule consists, rotate with great velocity about their common centre of mass in exceeding close proximity, and that a small impulse from without increasing the velocity as well as the distance of the atoms suffices to send them off in hyperbolic orbits to scatter destruction amongst the other molecules which they encounter? This might be the case if the velocity of the atoms greatly exceeds the velocity of agitation of the molecules on which the temperature depends.

## NEW DISCOVERIES AT BAOUSSÉ ROUSSÉ, NEAR MENTONE.

BY THE MARQUIS DE NADAILLAY.

I KNOW of no discovery touching pre-historic times more remarkable than those made in the caves of Baoussé Roussé, between Mentone and Ventimiglia, on the borders of France and Italy. These caves were first discovered in 1872 by Mr. Rivière. Since that time this learned gentleman has vigorously prosecuted his excavations,[1] and they have yielded numerous human skeletons, all belonging to the celebrated Cro-Magnon race, who at the end of the quaternary period, or perhaps at the beginning of neolithic times, ruled not only the south of France, but also all the Mediterranean shores. It is these same men we meet with under the names of Iberians, Ligurians, Sicanians, perhaps also under those of Pelasgians and Berbers. It is their bones that the brothers Siret found in the south of Spain, Professor Sergi in Italy, and Mr. Rivière at Baoussé Roussé.

All the bones, wherever found, show a great similitude. They are robust, and bespeak an athletic constitution and a large muscular power. The men were remarkably tall, the crania are dolichocephalic, the tibias platycnemic, but since Dr. Manouvrier's observations,[2] we cannot see there an inferior character. The cranium of the first skeleton found (an old man) measured 1,590 cubic centimeters. The cranium of the woman found next to him 1,450 cubic centimeters; but this last measurement is not quite accurate, on account of the decomposed state of the bones.

The man had upon his head a net of small shells (*Nassa neritea*), and bracelets of shells round his arms and legs. Near him Mr. Rivière collected more than 150 stone implements, and also numerous bones of mammals, birds, and fishes, evidently the food of these people.

New discoveries quickly followed the first ones, and we always find a particular mode of inhumation, which, I believe, still exists, or lately existed, in some Indian tribes. The bones of all the adults, after the total decomposition of the flesh, were painted in red with the help of peroxide of manganese or other substances frequently met with in the different caverns.

The last excavations took place in Februaay, 1892, in one of these caves, named Barma Grande. A communication made to the Academie des Inscriptions, March 4, 1892, informed us of the discovery, at 8 metres below the level of the ground, of three new skeletons, a man, a woman, and a young subject whose dentes sapientiæ had not yet evolved. They had been buried on a bed of cinders, broken fragments of charcoal, remains of all sorts, evidently the hearth on which the family cooked their victuals. The boy wore a necklace formed of two rows of the vertebræ of a fish and one row of small shells. At different points hung pendants cut out of the canine teeth of stags, decorated with parallel striæ. The man had also a necklace of fourteen canines of the stag, also striated. With the skeletons were found a certain number of stone instruments, some of them finely worked, but none of them polished, and some bone implements of very gross fabrication.

The man was very tall, and, if we judge by the length of the thigh-bone (545 millimeters), his height must have exceeded two metres[3] (6 feet 6 inches). The boy, who had not yet attained his manhood, measured 1.63 metres (5 feet 8 inches). We must also remark the extreme wear of the teeth, very apparent already in the boy, and which in the man extended to their very root. I have already said that the caves of Baoussé Roussé yielded numerous bones of mammals, but none of them belonged to the extinct species, not even to the reindeer which is found in the south of France even at a late period On the other hand, no polished stone implement was ever found in these caves. We can therefore give these men a pretty accurate date, and place their existence, as I have said, at the end of the quaternary or the beginning of the neolithic times. One cave remains as yet unexcavated. It belongs to the Prince of Monaco. Orders are given that the excavations shall begin next spring. If they produce anything of interest, I will not fail to report them to the readers of *Science*.

Rougemont, Sept. 2.

[1] They are related at length in "L'Antiquité de l'homme dans les Alpes maritimes." Paris, I. B. Baillière et fils, 1887.

## THE PREVENTION OF CHOLERA ASIATICA.

BY HUGH HAMILTON, M.SC., M.D.

THE symptoms of cholera are so well known that it is a matter of common knowledge; however, to make the subject plain, it is very similar to *Cholera Morbus*, well known to every American, which is due to indigestion and disorder from the eating of improper fruits or too large amounts of perfect raw fruit. In *Cholera Asiatica* there is vomiting, purging, chill, sweat, death in a longer or shorter period. When *Cholera Asiatica* is epidemic, many of these lesser complaints of the digestive apparatus pass under its name, and, as a consequence, many remedies seem to cure the disease, which in fact is probably not *Cholera Asiatica* but *Cholera Morbus*, which is bad enough.

[2] Dr. Manouvrier has shown that platycnemia is produced by long and hard work continuously acting on the muscles of the leg. It is found to a large extent in hard walkers, in populations living near the mountains. It is more frequent in men than in women; and it very rarely, if ever, exists in children.

[3] The state of the bones precluded any accurate measurement, and comparison, when we reach these extreme heights, is very difficult. The Museum of Paris possesses the skeleton of a giant who measured 2.14 metres, and whose thigh-bone measured 563 millimeters.